

**FEDERAL AID IN WILDLIFE RESTORATION  
MANAGEMENT REPORT OF SURVEY– INVENTORY ACTIVITIES**

**KENAI PENINSULA BROWN BEAR**

**1 JULY 1994 – 30 JUNE 1995**

**GAME MANAGEMENT UNITS: 7 (3,520 mi<sup>2</sup>) AND 15 (4,876 mi<sup>2</sup>)**

**GEOGRAPHIC DESCRIPTION: KENAI PENINSULA**

**BACKGROUND**

Brown bears are throughout the remote lowland forests and intermountain valleys of the Kenai Peninsula, excluding coastal portions of Unit 7 and the eastern side of Kachemak Bay. Historical brown bear range remains occupied except in developed areas. Field observations and data analysis indicate brown bear densities are highest in the forested lowlands and subalpine areas west of the Kenai Mountains.

The Kenai Peninsula comprises primarily federal lands (71%). The U.S. Forest Service (USFS) (Chugach National Forest, ca. 2,000 mi<sup>2</sup>) is the principle landowner in Unit 7, together with the National Park Service (NPS) (Kenai Fjords National Park, ca. 885 mi<sup>2</sup>). In Unit 15 the U.S. Fish and Wildlife Service (USFWS) (Kenai National Wildlife Refuge) is responsible for management of 3,062 mi<sup>2</sup>. Ownership of the remainder of Unit 15 varies between municipal, state, native corporation and other private lands.

Brown bears were first given game status in 1902 (Miller 1990a) with liberal seasons and bag limits. For example, in 1937-38 the season was 1 September to 20 June and the bag limit was 2 brown bears for coastal areas in southcentral and all of southeastern Alaska. The rest of the state did not have a closed season and there was no bag limit. At the time of statehood, the bag limit was 1 brown bear. The bag limit was reduced in 1967 from 1 bear per year to 1 bear every 4 years. Cubs and sows with cubs were protected. The season dates have ranged from 20 to 45 days. In 1978 a 10-day spring season was opened for Unit 15 and extended to the current 15-day season (10-15 May) in 1980. The Unit 7 spring season opened in 1980 concurrently with Unit 15.

In 1984 representatives of the USFWS, USFS, NPS, and Alaska Department of Fish and Game (ADF&G) formed an Interagency Brown Bear Study Team (IBBST) to discuss brown bear management and research needs on the Kenai Peninsula and to coordinate joint studies. The IBBST coordinated a baseline inventory (Bevins *et al.* 1984, Risdahl *et al.* 1986) of salmon streams and known high-use brown bear areas and detailed ground and habitat surveys (Schloeder *et al.* 1987 and Jacobs *et al.* 1988). Recently, this team expressed concern about the increasing trend in brown bear mortality on the Kenai and potential for additional mortality from human encroachment into bear habitat.

A cumulative effects model was developed to identify brown bear habitat on the Kenai at risk to human activities (Suring *et al.* In Press). The IBBST is drafting an interagency brown bear management plan using guidelines provided by Jacobs (1989). In 1995 ADF&G initiated a research project in cooperation with the other members of the IBBST to evaluate the cumulative effects model, assess brown bear habitat, estimate survival of bears and ultimately model the brown bear population on the Kenai (Schwartz and Arthur 1996, Schwartz *et al.* In Press). This project is scheduled to run through FY98.

## **MANAGEMENT DIRECTION**

### **MANAGEMENT OBJECTIVES**

Maintain a population of 250 brown bears with a sex and age structure that will sustain a harvest of less than 40 % females (three year average of 6 female units).

## **METHODS**

Cost-effective survey techniques to determine brown bear population size over large forested areas have not been developed and tested. We derived a population estimate for the Kenai by assessing suitable habitat and comparing estimates of bear density to other parts of Alaska. Suitable brown bear habitat was estimated by mapping (1:250,000 topographic map) harvest locations of brown bears killed between 1961 and 1993. We approximated the area used by brown bears by including similar habitat surrounding the harvest location and calculated the area within the polygon for each game management unit. We included all land above mean high tide, roads, water bodies (except Skilak and Tustumena lakes), and municipalities. We assumed that all bears were harvested within their normal home ranges and that similar adjacent land was also suitable habitat.

Miller (pers. comm.) suggested the density of brown bears on the Kenai was probably lower than 27.1 bears per 1,000 km<sup>2</sup> (7.0 bears per 100 mi<sup>2</sup>) that he reported for other areas in southcentral Alaska (1987). We estimated the bear density on the Kenai to be 20 bears per 1,000 km<sup>2</sup> (5.2 bears per 100 mi<sup>2</sup>), and we calculated the suitable habitat to be 13,848 km<sup>2</sup> (5,347 mi<sup>2</sup>). We derived a brown bear population estimate for Units 7 and 15 by multiplying the suitable habitat by the density estimate.

In the spring of 1995, the department drafted a Brown Bear Management Protocol. This protocol described the desired management strategies to achieve management objectives. This protocol is listed as Appendix A.

Since 1961, a mandatory sealing program has provided information on all harvested bears, including distribution and sex-age composition.

## **RESULTS AND DISCUSSION**

### **POPULATION STATUS AND TREND**

#### *Population Size:*

Assuming that the brown bear density was 20 bears per 1,000 km<sup>2</sup> (5.2 bears per 100 mi<sup>2</sup>), and the suitable habitat was 13,848 km<sup>2</sup> (5,347 mi<sup>2</sup>), we estimated the brown bear population for Units 7 and 15 at 277.

#### *Distribution and Movements:*

Brown bears occur throughout the Kenai Peninsula with the exception of coastal areas of Kenai Fjords National Park and the southern portions of the peninsula (Schloeder *et al.* 1987, Jacobs *et al.* 1988).

### **MORTALITY**

#### *Harvest:*

Season and Bag Limit. The bag limit for Units 7 and 15 was 1 bear every 4 regulatory years. The bear hunting season was 1 October to 25 October and 10-25 May for subsistence, resident, and nonresident hunters.

Game Board Action and Emergency Orders. In 1989 the Board of Game shortened the fall brown bear season by 14 days, creating a fall opening date of 15 September. The reason for this change was to reduce the incidental take of brown bears by moose hunters. During the spring 1994 Board of Game meeting, the Board shortened and moved the fall hunting season to 1-25 October in response to continued high harvest levels. The fall 1995 season was closed by emergency order because additional harvest from the fall season would exceed management objectives.

The department drafted a proposal to the Board of Fisheries to close Russian creek to fishing for the month of August to protect a brown bear concentration area. The Department of Law advised the BOF that they did not have the authority to regulate a fishery for wildlife conservation. The proposal was referred to the Joint Boards of Fisheries and Game. This proposal has been deferred until April 1997.

Hunter Harvest. Annual harvest levels continued to exceed management objectives. Twenty bears were taken during regulatory year 1994-95. Hunters harvested 6 bears (3 males (50%), 3 females (50%)) in the fall of 1994. An additional 6 bears (2 males (33%) and 4 females (66%))

were reported in the spring of 1995 (Table 1). Eight bears (5 males and 3 females) were taken as nonsport (all defense of life and property) mortalities.

Fifteen bears were taken during regulatory year 1995-96. The fall 1995 season was closed by emergency order. Five bears (3 males (60%) and 2 females (40%)) were reported in the spring of 1996 (Table 1). Ten bears (3 males and 7 females) were taken as nonsport (nine defense of life and property and one male research) mortalities.

Hunter Residency and Success. Local residents took 25% and 80% of bears harvested in regulatory years 1994-95 and 1995-96, respectively. Nonlocal residents took 67% and 20%, while nonresidents took 8% and no bears in each of the 2 regulatory years, respectively (Table 2).

Harvest Chronology. The proportion of bears taken between fall and spring seasons were approximately split 50:50 (Table 3) since the 1992-93 season. In 1995-96, however, all bears were harvested in May because the fall season was closed.

Transport Methods. Successful brown bear hunters have used all transportation methods with the exception of snowmachines during the past five years. In 1994 most hunters used Highway vehicles (58%) followed by hunters using horseback and boat. In 1995 most hunters used Highway vehicles (60%) followed by hunters using 4 wheelers (40%) (Table 4).

Nonregulatory Management Problems/Needs. The Department and other resource management agencies should implement a long-term brown bear management plan. The IBBST draft management plan will provide the framework for such a working plan. Recently, this team has expressed concern over a trend in increased brown bear mortality on the Kenai Peninsula and the potential for additional mortality from human encroachment into bear habitat.

Timber harvests designed to salvage damaged timber and control the spread of spruce bark beetles (Dick *et al.* 1992) could be a major factor affecting the abundance of brown bears. The Forest Health Management Plan encompasses approximately 60% of the Kenai Peninsula and most of the brown bear habitat. The plan prioritizes over 426,000 acres of forest lands for salvage cutting. Logging mature forests may affect brown bears in numerous ways, including fragmentation of forest habitat and increased access through an extensive road system.

## **CONCLUSION AND RECOMMENDATIONS**

Management objectives were exceeded in three of the last 5 years. The number of DLP's has increased, negating the effects of season changes. Miller (1990b) used computer simulations to derive a maximum sustainable hunting mortality rate of 5.7% of a population of brown bears under optimum productivity. Under the current management objective, and as a conservative

measure, we suggest using an estimated population of 250 brown bears until more reliable density data are available. Further restrictions in the fall season may be necessary to offset the increased DLP rate.

Taylor *et al.* (1987) noted that survival of adult female bears was the predominant factor affecting population dynamics. To maintain a population of 250 bears on the Kenai Peninsula, the harvest of females should not exceed 40%, or a 3-year mean annual harvest of 5.7 females. We refined the desired harvest rate quota by using the point system similar to Smith (1989) to account for young female bears ( $\leq 2$  years of age) taken primarily in nonsport situations. These bears were assumed to have a lower reproductive value, and therefore should be assigned lower scores than those of older females. Specifically, female bears  $\leq 2$  years of age were assigned only half the value of older females.

The management objectives were revised to indicate the new 3-year mean annual harvest should not exceed 6 “female units.” A 3-year mean allows for any abnormal harvest variations caused by weather, food availability, or changes in human use patterns. We need to closely monitor the harvest of adult female bears, particularly during the fall season. If the mean harvest is substantially above the recommended annual quota of 6 female points, the department should curtail the harvest through emergency action. Because bears are polygamous, the number of males may not be as crucial as is the number of females. In future years if the harvest of males continues to increase, we may need to set a numerical limit for both sexes. The management protocol drafted in 1995 describes specific actions to be taken (Appendix A).

The long-term health of brown bears on the Kenai Peninsula depends upon maintaining quality bear habitat. There are 2 activities that will affect bear abundance. The proposed forest management plan (Dick *et al.* 1992) may affect bears through the logging of mature forest stands and the building of roads into previously inaccessible areas. Perhaps more importantly, commercial, recreational, and residential developments on the Kenai Peninsula will continue to reduce the quantity and quality of brown bear habitat as well as restrict travel corridors for bears.

We need to continue to monitor the sport and nonsport harvest by season, location, and cause to identify any tangential management issues that may affect bear mortality. Potential issues include other big game seasons that overlap with brown bear seasons, brown bears taken in proximity to black bear bait stations, bear/human conflicts in important bear habitat (i.e., Russian River Skilak lake campgrounds and Caribou Hills cabin areas), private and borough dumpster problems, and bear/livestock interactions.

The Kenai Peninsula brown bear population is essentially closed. Appreciable immigration is unlikely because the city of Anchorage is adjacent to the Kenai, and the area around Turnagain Arm is not known for high brown bear densities. Because the Kenai Peninsula is essentially a closed system, some areas that could support slightly higher harvests can serve as refugia for areas that may be more highly impacted.

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## Appendix A.

### **BROWN BEAR MANAGEMENT PROTOCOL**

Background. Brown bear management on the Kenai Peninsula continues to be challenging. Human related mortality has increased substantially in recent years (Fig. 1) despite regulatory actions to reduce sport hunting. In 1989, the Board of Game shortened the fall brown bear season by 14 days creating a fall opening date of 15 Sept. in an effort to reduce the incidental mortality caused by moose hunters. In 1994 the Board shortened and moved the fall season to 1-25 October in response to continued high harvest levels. This regulatory change succeeded in reducing the fall harvest. However, a high defense of life and property mortality during 1994 negated the effects of the shorter season. This protocol will recommend both short term and long term management strategies.

In 1984 representatives of the U.S. Fish and Wildlife Service, U.S. Forest Service, National Park Service, and the Alaska Department of Fish and Game formed the Interagency Brown Bear Study Team (IBBST) to discuss brown bear management and research needs on the Kenai Peninsula and to coordinate joint studies. Most recently, this team has expressed concern about the increasing trend in brown bear mortality on the Kenai and the potential for additional mortality from human encroachment into bear habitat.

The total area of suitable habitat for brown bears is approximately 13,848 km<sup>2</sup> (5409.4 mi<sup>2</sup>) and is equivalent to 63% of the Kenai Peninsula landmass (Del Frate 1993). Miller (pers. comm.) suggested that the density of brown bears on the Kenai is probably lower than he reported for the middle Su hydro study area (27.1 bears per 1000 km<sup>2</sup>) Miller 1987). Therefore, we assumed the density of bears on the Kenai was approximately 20 bears per 1000 km<sup>2</sup>. A point estimate of 277 bears was then calculated for 13,848 km<sup>2</sup> of suitable habitat. For the purposes of this management exercise a conservative population estimate of 250 was used to allow for unoccupied bear habitat in and around municipalities.

In the 1990-92 Brown Bear Management Report we recommended a sustainable harvest rate of 14 bears with a maximum of 6 females (Del Frate 1993). Smith (1989) used a sex weighted point system to encourage guides and outfitters to take predominantly males in Yukon Territories. By assigning females with a greater point value and then allocating guides with a certain number of points, it was in the guides best interest to harvest males. Management on the Kenai differs from the Yukon in that the guide proportion of the bear mortality is very small (one out of 23 harvested in 1994 and 6 out of 25 in 1993). However, the point system has some applicability for season closures when the total number of female points has been reached.

We refined the desired harvest rate quota by using the point system to account for young female bears (<3 years of age) that were taken primarily in non sport situations (Del Frate In Press). These bears were assumed to have a lower “reproductive value” and therefore should not count as much as older bears. Specifically, female bears < 2 years of age were assigned only half the value of older female bears. The new sustainable harvest rate should not exceed 5.6 “female units.” This system compensates for years when higher than normal yearling and 2 year old harvest occur.



Management objectives. The management objectives for the Kenai Peninsula are to maintain an estimated population of 250 brown bears with a sex and age structure that will sustain a harvest comprised of at least 60% males.

Management Strategies. We should consider the following protocol for long term management of Brown bears on the Kenai Peninsula.

- Maintain seasons and bag limits that are most attractive to brown bear hunters and least impacted by other incidental mortality.
- Manage bears on the Kenai Peninsula as a closed population. There is probably very little immigration since the Municipality of Anchorage is adjacent to the Kenai and the area around Turnagain Arm is not known for high brown bear densities. Decisions should not be made for one subunit that may negatively impact brown bears in other areas. Furthermore, since the Kenai is “closed” areas that may be slightly under harvested can serve as refugia for areas with higher impact.
- Base all management decisions on a 3-year average of all mortality data. Three years allow for any abnormal harvest variations because of weather, food availability, or human use patterns.
- Maintain a harvest objective of no more than 5.6 female units based on a 3-year average. Consider females <3 years old as half the value of older females (0.5 female units). At the current levels of harvest the number of females taken in any given year will determine the growth or decline of that population. Because bears are polygamous breeders the number of males may not be as crucial. In future years if the harvest of males continues to increase we may need to set a numerical limit.
- Management decisions should then be made for the next calendar year by calculating the total number of female units taken the previous 2 years. If the previous years harvests were excessive and it is necessary to make a decision for the following year, it can be made well in advance of the spring season. The Department could also make any necessary changes to the upcoming regulation book before printing.
- Spring seasons appear to be the most desirable to direct the sport harvest. The proportion of males to females taken is highest and the proportion of incidentally taken bears is the lowest. Therefore, any restrictions should first be considered for the fall season. During the fall season there are many other activities occurring where bears may be taken incidentally.

- Base all management decisions on calendar years. Spring harvests should continue to be monitored to determine if any in season changes are necessary for the fall. Management decisions can still be made by July 1 after all spring bears have been handled and sealed.
- If necessary, require sealing in a timely manner (5-10 days) if harvest assessment can not be accomplished with a 30 day requirement. I would not recommend this at this time unless we have to manage bears in season. A request to all sealers to estimate age of the bears would also help to properly assign points to female bears.
- Include all known human caused removals (i.e. trap and transplant, roadkill, DLP, etc.) when determining allowable harvest.
- Monitor the sport and nonsport harvest by season, location, and cause to identify any non brown bear management issues that may affect the mortality of bears. Potential issues include other big game seasons that overlap with brown bear seasons, brown bears taken in proximity to black bear bait stations, bear/human conflicts in important bear habitat (i.e., Russian River Skilak lake campgrounds, and Caribou Hills cabin areas), private and Borough dumpster problems, and bear/livestock interactions. Make recommendations to the respective agencies, departments, or divisions to alleviate future problems and reduce non sport harvest of bears.
- Review this protocol following any significant changes in population parameters or sustainable harvest calculations.

### **RECOMMENDED ACTION FOR 1995**

Given the above protocol and the trend in figure 2, I recommend the following:

- The harvest objective is 5.6 female units per year or 16.8 for 3 years. Six female units were taken in both 1993 and 1994. The total allowable harvest for 1995 would then be a maximum of 4.8 female units.
- Allow the spring season to run its course. In the past 15 years the spring harvest averaged only 5.2 bears and 1.4 females >2. In the past 5 years the average was 7.8 bears and 2.0 females >2. Using the above point system for females the 15 year average was 1.6 females and the 5 year average was 2.3. If the 1995 spring harvest is equal to the previous 5 year mean and that is the only harvest, then we would be within 2.5 females of the 3-year quota. Three female bear units were taken in defense of life and property during the fall portions of 1992 and 1993. We should allow for some DLP mortality for the rest of 1995.

- Close the fall brown bear season by emergency order and list the closed season in the 1995-96 regulation book. Assuming an average spring harvest of 2.3 bears (by points), we would be within 0.8 female bears of our 3-year mean without considering DLP's or other nonsport kills. Therefore, I would recommend that the EO be written after the spring season so we don't encourage additional hunters in the spring.
- Reevaluate the 1995 brown bear mortality in November. At this point we should consider whether to draft a proposal for the BOG or use EO authority for a couple of years. The big unknown is how many non sport kills we will have this year.

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Table 1. Units 7 and 15 brown bear harvest, 1991-95.

Regulatory year	Reported													
	Hunter Kill				Non-hunting kill <sup>a</sup>			Total estimated kill						
	M	F	Unk.	Total	M	F	Unk.	M	(%)	F	(%)	UNK.	(%)	Total
1991														
Fall 91	4	4	0	8	1	1	0	5	(50)	5	(50)	0	(0)	10
Spring 92	3	1	0	4	0	0	1	3	(60)	1	(20)	1	(20)	5
Total	7	5	0	12	1	1	1	8	(53)	6	(40)	1	(7)	15
1992														
Fall 92	4	6	0	10	3	0	1	7	(50)	6	(43)	1	(7)	14
Spring 93	9	4	0	13	0	0	0	9	(69)	4	(31)	0	(0)	13
Total	13	10	0	23	3	0	1	16	(59)	10	(37)	1	(4)	27
1993														
Fall 93	5	3	0	8	3	1	0	8	(67)	4	(33)	0	(0)	12
Spring 94	6	2	0	8	3	0	0	9	(82)	2	(18)	0	(0)	11
Total	11	5	0	16	6	1	0	17	(74)	6	(26)	0	(0)	23
1994														
Fall 94	3	3	0	6	4	3	0	7	(54)	6	(46)	0	(0)	13
Spring 95	2	4	0	6	1	0	0	3	(43)	4	(57)	0	(0)	7
Total	5	7	0	12	5	3	0	10	(50)	10	(50)	0	(0)	20
1995														
Fall 95	0	0	0	0	1	5	0	1	(17)	5	(83)	0	(0)	6
Spring 96	3	2	0	5	2	2	0	5	(56)	4	(44)	0	(0)	9
Total	3	2	0	5	3	7	0	6	(40)	9	(60)	0	(0)	15

<sup>a</sup>Includes DLP kills, research mortalities, and other known human-caused mortality.

Table 2. Unit 7 and 15 brown bear successful hunter residency, 1985-95.

Regulatory year	Local <sup>a</sup> resident	(%)	Nonlocal resident	(%)	Nonresident	(%)	Total successful hunters <sup>b</sup> <u>n</u>
1985-86	6	(40)	7	(47)	2	(13)	15
1986-87	11	(69)	4	(25)	1	(6)	16
1987-88	4	(33)	5	(42)	3	(25)	12
1988-89	7	(58)	0	(00)	5	(42)	12
1989-90	4	(67)	1	(17)	1	(17)	6
1990-91	7	(64)	1	(9)	3	(27)	11
1991-92	5	(42)	3	(25)	4	(33)	12
1992-93	11	(48)	8	(35)	4	(17)	23
1993-94	10	(63)	2	(13)	4	(25)	16
1994-95	3	(25)	8	(67)	1	(8)	12
1995-96	4	(80)	1	(20)	0	(0)	5

<sup>a</sup> Local resident means residents of Units 7 or 15.

<sup>b</sup> Does not include nonsport harvest.

Table 3. Units 7 and 15 brown bear harvest chronology percent by time period, 1985-95

Regulatory year	Harvest periods			<u>n</u> <sup>a</sup>
	September	October	May	
1985-86	60	20	20	15
1986-87	56	19	25	16
1987-88	42	25	33	12
1988-89	75	0	25	12
1989-90	33	0	67	6
1990-91	55	0	45	11
1991-92	58	8	33	12
1992-93	39	4	57	23
1993-94	13	38	50	16
1994-95	0	50	50	12
1995-96	0	0	100	5

<sup>a</sup> Does not include nonsport harvest.

Table 4. Units 7 and 15 brown bear harvest percent by transport method, 1985-95.

Regulatory year	Percent of Harvest									<u>n</u> <sup>a</sup>
	Airplane	Horse	Boat	3 or 4-wheeler	Snowmachine	ORV	Highway vehicle	Walk	Unk.	
1985	7	13	33	0	0	13	7	7	20	15
1986	12	6	19	0	0	19	12	12	19	16
1987	25	33	17	0	0	0	33	0	0	12
1988	8	42	8	0	0	17	17	0	8	12
1989	17	0	33	0	0	0	0	17	33	6
1990	9	27	9	9	0	9	18	9	9	11
1991	17	25	17	0	0	8	8	8	17	12
1992	13	13	17	13	0	4	30	9	0	23
1993	0	6	69	6	0	0	19	0	0	16
1994	0	17	17	0	0	0	58	0	8	12
1995	0	0	0	40	0	0	60	0	0	5

<sup>a</sup> Does not include nonsport harvest.